DEVELOPMENT OF INFORMATION SYSTEM FOR PATIENT MEDICAL SERVICES AT PKU MUHAMMADIYAH KUTOARJO

This Final Project is Compiled as a Condition to Complete Bachelor Degree Program at Informatics Department in Faculty of Communication and Informatics

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SCIENTIFIC PUBLICATION

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DEVELOPMENT OF INFORMATION SYSTEM FOR PATIENT MEDICAL SERVICES AT PKU MUHAMMADIYAH KUTOARJO

Abstrak

Informasi pasien adalah informasi terpenting di rumah sakit yang harus didistribusikan dari satu bagian ke bagian lainnya dengan cepat karena dokter, dokter, perawat, dan profesional perawatan lainnya di rumah sakit memerlukan informasi tersebut. Perlu waktu lama bagi para profesional perawatan untuk mendapatkan data pasien jika data masih ditangani secara manual. Kendalanya juga dialami di PKU Muhammadiyah Kutoarjo. Selain itu, akan ada dokumen rekam medis yang disimpan di ruang arsip karena penyedia layanan kesehatan masih mengandalkan catatan medis kertas sebagai sumber informasi pasien utama. Oleh karena itu, akan lebih efektif jika ada sistem informasi *real-time* dan *paperless*, karena penggunaan komputer saat ini sudah sangat umum. Aplikasi yang diajukan akan menggunakan aplikasi berbasis web untuk menangani data pasien, sejak pendaftaran, kemajuan perawatan medis sampai data disimpan sebagai rekam medik. Dalam perkembangannya, aplikasi berbasis *web* ini menggunakan CodeIgniter PHP Framework dan MySQL sebagai pengelola *database*. Aplikasi berbasis web ini dipilih karena dapat dengan mudah diakses oleh dokter dan perawat melalui perangkat yang terhubung ke jaringan area lokal rumah sakit tanpa sampai ke ruangan tertentu. Metode pengumpulan data untuk aplikasi ini adalah dengan menggunakan wawancara dan observasi lapangan.

Kata kunci: codeigniter, sistem informasi, pelayanan medis pasien, PKU Muhammadiyah Kutoarjo, aplikasi berbasis web.

Abstract

Patient information is the most important information in the hospital that must be distributed from one section to another quickly because doctors, physicians, nurses, and other care professionals in the hospital need that information. It will take a long time for those care professionals to obtain the patient data if the data is still handled manually. The constraint is also experienced at PKU MuhammadiyahKutoarjo. Additionally, there will be a medical record papers stacking in the archive roomsince the health care providers still rely on paper medical records as the primary source of patient information. Therefore, it will be more effective if there is a real-time and paperless information system, since the use of computers nowadays has become very common. The application proposed will be using web-based application to handle the data of the patient, since the registration, the progress of medical treatments until the data are saved as medical record. In its development, web-based application is using CodeIgniter PHP Framework and MySQL as the managerial of the database. Web-based application is chosen because it can be easily accessed by the doctors and nurses through any devices which are connected to the local area network of the hospital without arriving to the certain room. The method to collect the data for this application is using interview and field observation.

Keywords: codeigniter, information system, patient medical service, PKU Muhammadiyah Kutoarjo, web-based application.

1. INTRODUCTION

Muhammadiyah is a large Islamic organization in Indonesia. The organization, as recited in Statute of Muhammadiyah (*AnggaranDasarMuhammadiyah*), has the purpose to enforce and uphold Islamic religion as a result embodied the real Islamic community (Muhammadiyah, 2010). In realizing the purpose, Muhammadiyah is not only preaching to lecture in the mosque, but also during the daily lives through the Charitable Efforts of Muhammadiyah (*Amal Usaha Muhammadiyah*/AUM). One of the AUM's activity field is in the field of health and social service. The role of managing this field is by establishing the hospital of PKU (*PembinaKesejahteraanUmat*) Muhammadiyah in all over the country, including a small city named Kutoarjo.

In the hospital, usually the information about patient needs to be distributed quickly from one to another section because it is the important information. It will take a long time for the nurses to transfer this information if the data is still handled manually. The constraint may also be experienced at PKU MuhammadiyahKutoarjo. Beside of the constraint in transferring the patients' data, in term of storage space, there will be a lot of medical record papers stacks inside the archive room. Some physicians, nurses, and other care professionals can obtain some of the patient information they need from computer terminals located in patient care areas, but more health care providers still rely on paper medical records as the primary source of patient information (Drazen, Metzger, Ritter, &Schenider, 2012). In case the doctor needs to check the record of patient again, the hospital staff have to struggle in the archive room to find that patient's medical record.

According to the problems above, to abridge the process of distributing information at PKU MuhammadiyahKutoarjo will be more effective if there is a real-time and paperless information system, since the use of computer nowadays has become very common. The data of the patient, since the registration, the progress of medical treatment until the data is saved as medical record, is proposed to be handled by a web-based information system.Web-based application is chosen because it can be easily accessed by the doctors and nurses through any devices which are connected to the local area network of the hospital without arriving to the certain room.

The advantages expected in this study are that the patient will get a quick medical service and the progress of condition and the related treatment will be real time. The doctor and nurses can easily access the data of patients everywhere. The data of the patient can also be distributed simply to the other sections. Moreover, in case that the patients come for the second time to the hospital, the doctor will not check them up all over again from the beginning because the medical records have been stored in the database. The doctor only needs to input the patient ID which is written in the patient card to access the medical record and he can check them without worrying about the allergies or

other diseases of the patients. In term of storage space, there will be less stacks of papers in the archive room, so that the needs of paper can be reduced.

2. METHOD

This web-based information system of patient medical service will be developed to facilitate PKU MuhammadiyahKutoarjo in processing the data of the patients. It will consist of the first registration data of patient with the output of patient card; then the data can be delivered to ICU, to the doctors, and nurse section; doctor can directly input the patient's condition and doctor's course of action to the medical record database of the patient in the device.

Waterfall development methodology is the method used to develop the program. The Waterfall SDLC model is a sequential software development process in which process is regarded as flowing increasingly downwards through a list of phases that must be executed in order to successfully build a computer software (Bassil, 2012). Waterfall development methodology comprises five phases, such as analysis, design, implementation, testing,and maintenance. The further explanation is illustrated on Figure 1 below.

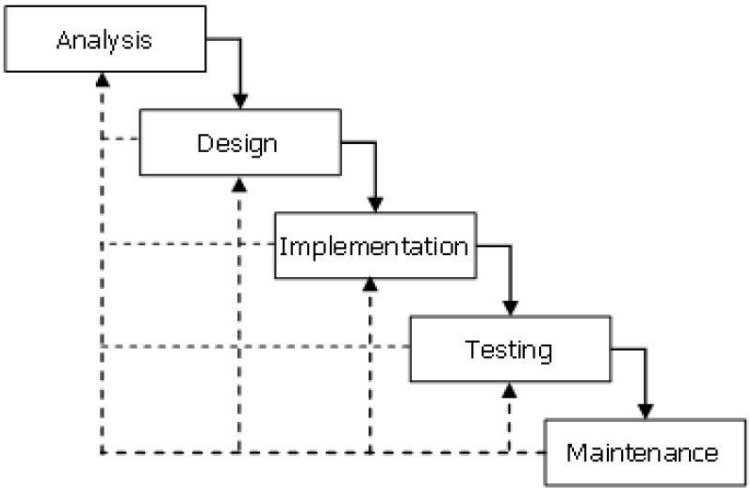

Figure 1. Waterfall Development Methodology

2.1 Analysis

The first phase needs to collect requirements from PKU MuhammadiyahKutoarjo using observation and interview method before analyzing them. The observation is performed to study if there has been developed a related application. The interview isconducted to assemble somenecessities of the hospital related to the patient data processing. The requirements concerned to this study include patient registration, patient examination, and recording the patient examination result and courses of action. The workflow of the patient data handling is described shortly at the Figure 2 below.

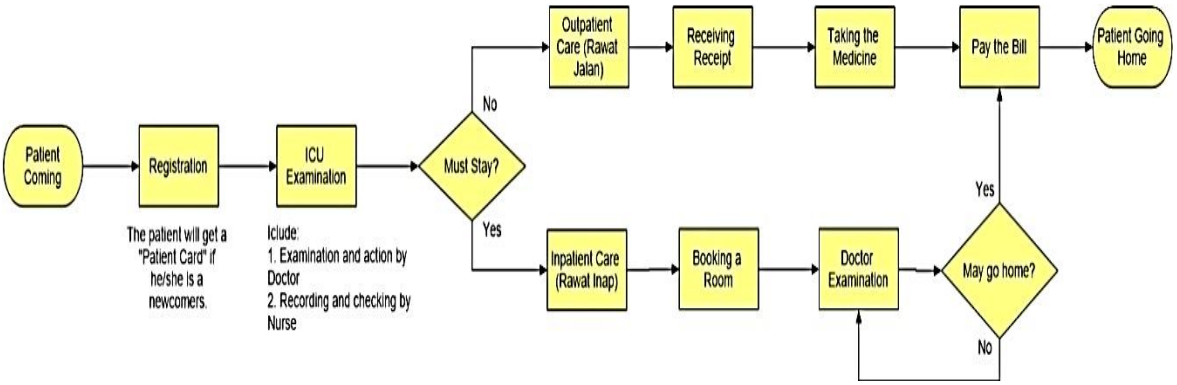

Figure 2. Workflow of patient data handling in hospital

The application is required to be simply operated by the receptionist from registering the data of patient then transferring the data to ICU, doctors and nurse's section. After having the medical treatments from doctor, then the doctor will input the record to the medical record table of the patient. Doctor examination to patient and the courses of action will be automatically stored in the database and can be views as the whole medical record of the patient. The medical record later can be accessed another time by the doctor as necessary.

2.2 Design

The design of application is described using the use case diagram, database design, and interface layout.

a. Use Case Diagram

Use case diagrams (UCDs) are widely used to describe requirements and desired functionality of software products(Grechanik, McKinley, & Perry, 2007).Since every action will be performed by different users, the privileges of the users are described on Figure 3 as follows.

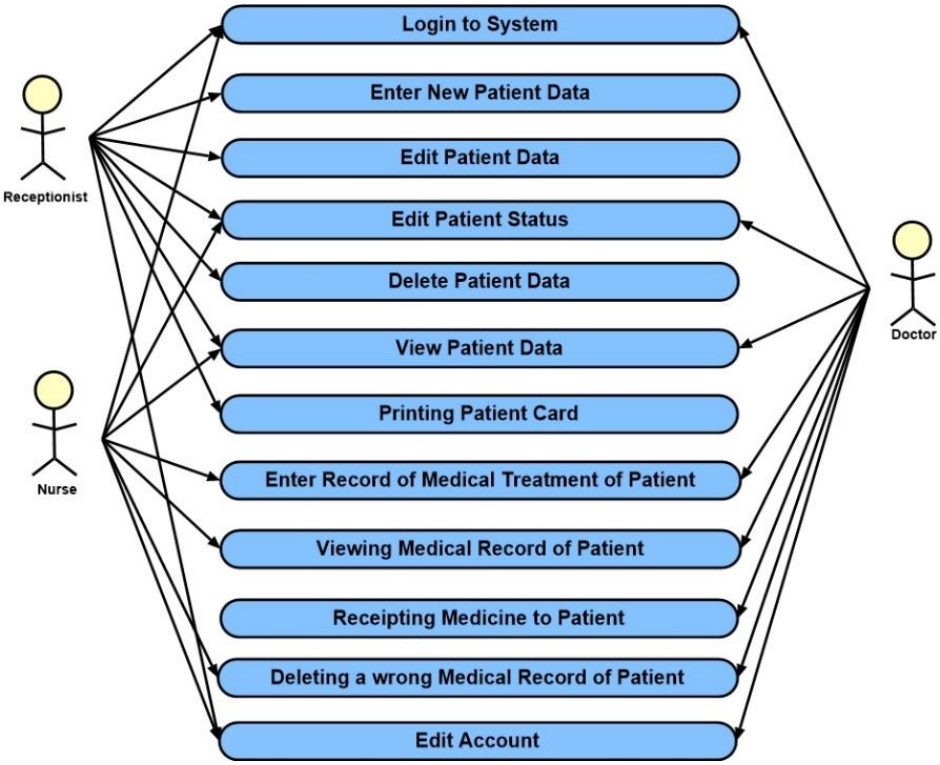

Figure 3. Use Case Diagram

b. Database Design

Entity Relationship Diagram (ERD) is a model which is used to describing data in the form of entity, attribute and relationship inter entity (Kadir, 2009). The design of the database is portrayed on Figure 4 as follows.

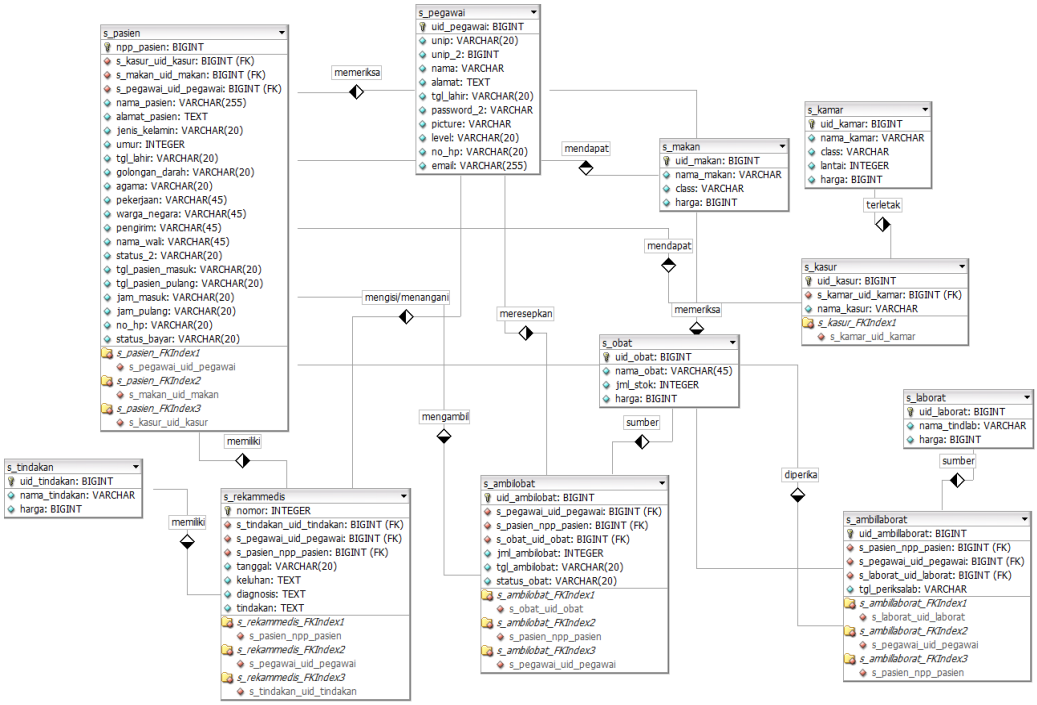

Figure 4. Entity Relationship Diagram (ERD)

As showed on Figure 4 above, the database to handle the data of the patients consists of 11 tables that cope with the registration, medicalcheckup, medical treatment, and medical record.

c. Interface Layout

Representing the design of the interface will be considerably illustrated in the Figure 5 and Figure 6 below.

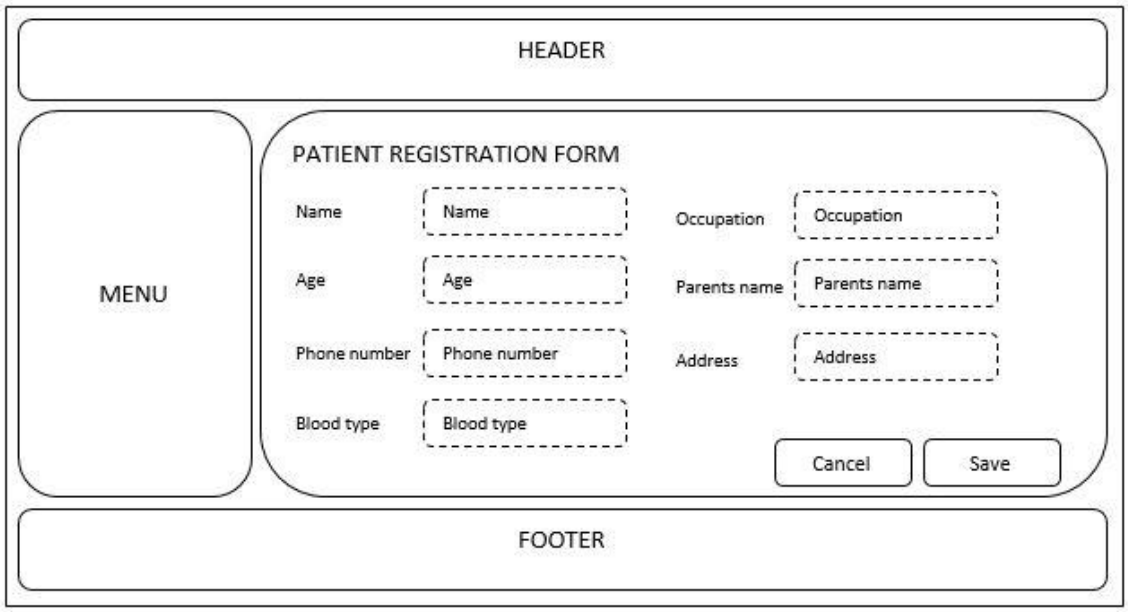

Figure 5. Interface Design 1

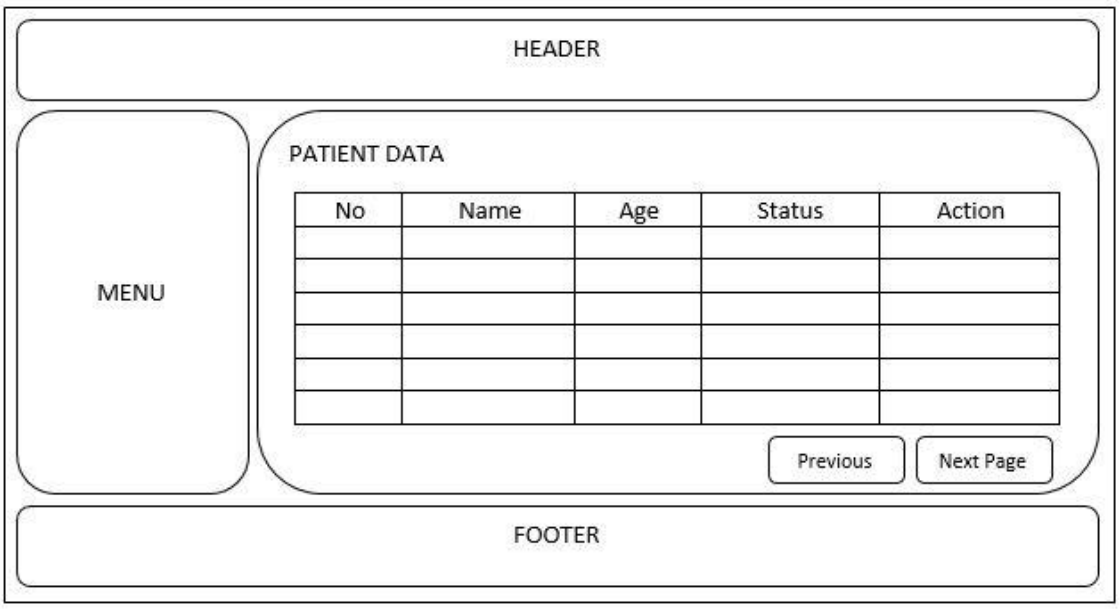

Figure 6. Interface Design 2

2.3 Implementation

The application will be constructed using CodeIgniter 3.1.3 to manage the web system; Bootstrap AdminLTE-2.3.0 to design the layout of user interface; and MySQL as the database management. According to Basuki (2010) CodeIgniter is a PHP Framework that can help developer to hasten the development of PHP-based website application ratherthan writing the whole source code from the beginning.Software technologies that are used to build the application including Sublime Text 3, XAMPP Control Panel v3.2.1, and Google Chrome web browser. After the building process iscomplete, the implementation of the application will be given to the hospitalside.

2.4 Testing

The testing method may be using the black box testing that ignores the internal mechanism of a system or component and focused solely on the outputs generated in response to selected inputs and execution conditions (Williams, 2006). According to Williams (2006) too, black box testing focuses on determining whether or not a program does what it is supposed to do based on its functional requirements. This type of testing is the suitable type since the examiners are from the side of PKU MuhammadiyahKutoarjo themselves, who may be not too familiar with the programming code.

2.5 Maintenance

The maintenance will be continued after the application has been implemented in the real field by fixing the bugs in the program that might be found later that cause the system to not run properly.

3. RESULT AND DISCUSSION

3.1 Result

The system interface is divided into several pages based on the user level login. User lever is determined by the profession/position in the hospital. The first is receptionist page, since the earliest thing to do when the patients come to the hospital, they need to register at the receptionist desk and fill their personal data. The receptionist will click on “Data Pasien” menu, then the system will show the list of patients already registered at the hospital. The layout is presented on Figure 7 below.

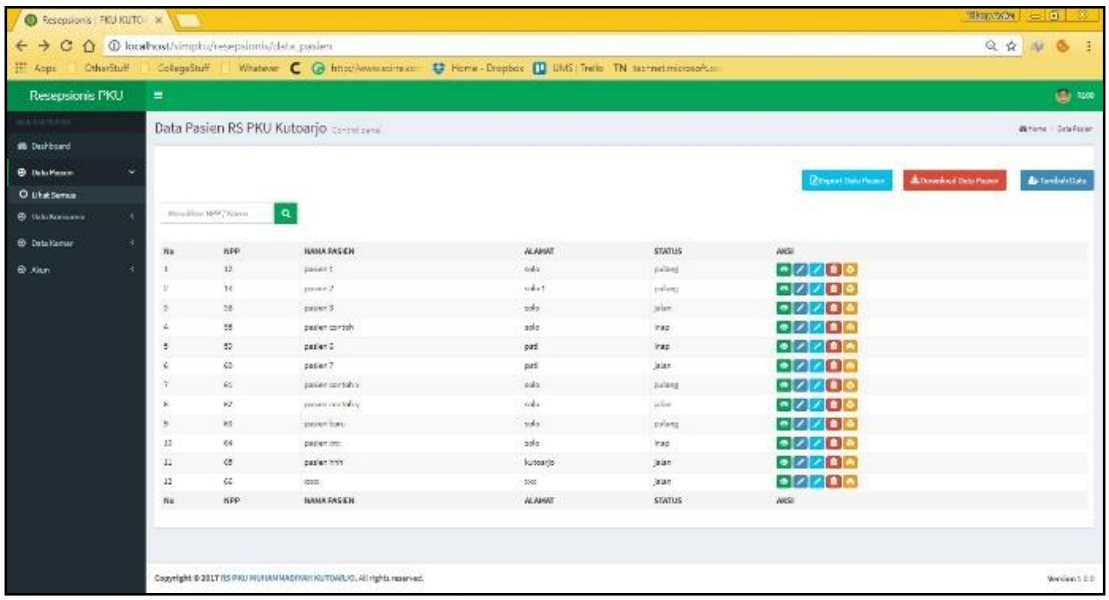

Figure 7. Layout of "Data Pasien" Menu

If the patient has already registered at the hospital, the receptionist only need to edit the status of the related patient. The receptionist can search the name or the ID number of the patient to find the data easily. On the other way, if the patient has not registered yet at the hospital, the receptionist will click on "Tambah Data" button at the above-right corner of the layout then the layout will move to a registration page like Figure 8 as follows.

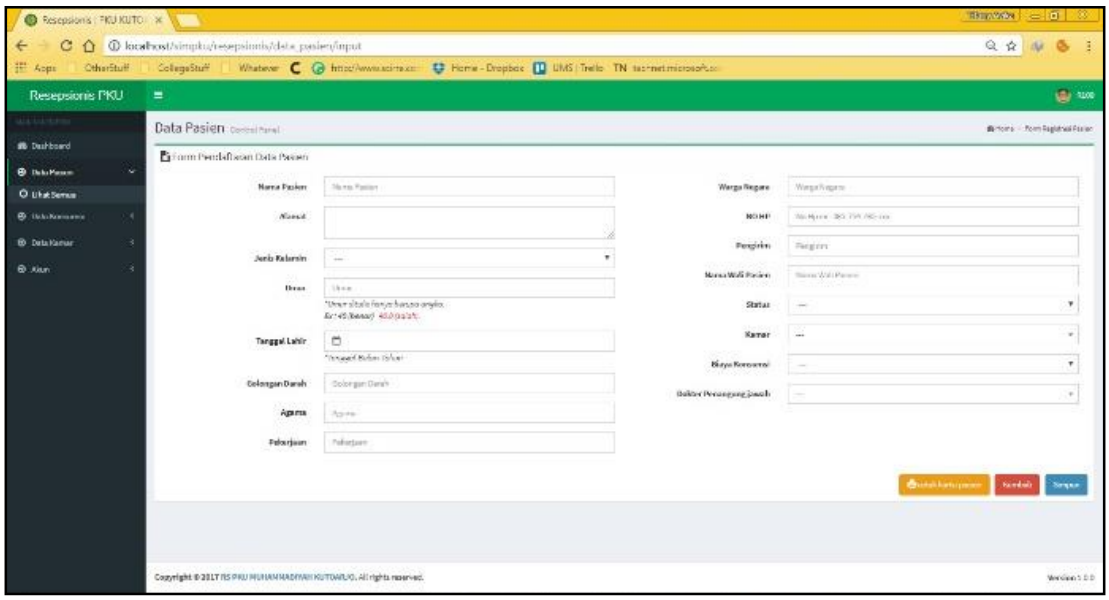

Figure 8. Patient Registration Form

The registration form consists of the personal data of the patient, such as name, address, gender, age, date of birth, blood type, religion, occupation, nationality, phone number, and the person legally responsible for the patient, that must be filled then it will be stored directly in the database by

clicking on the “Simpan” button. After the form is completed and saved, the receptionist will print a patient card. The layout of the patient card is as Figure 9 below.

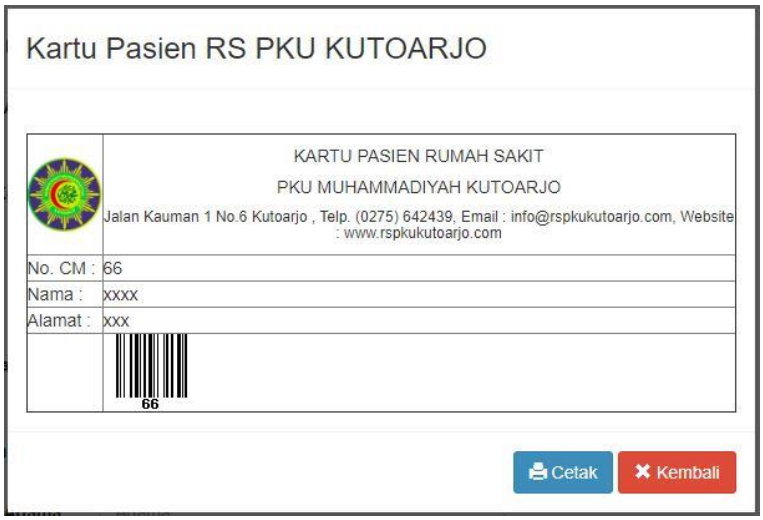

Figure 9. Patient Card

Beside handling the personal data of the patient, receptionist can also update the status of the patient if the patients must be either outpatient care (*rawatjalan*) or inpatient care (*rawatinap*). If the patient has to stay at the hospital, so the receptionist will book a room for the patient. The receptionist will register the food class that the patient wantsas well.

The second page is nurse page. It handles the recording part of every step doctor takes toward the patient. So that after receiving the card, the patients need to go to ICU or to the room that is directed by the officer there to get some examinations about their illness and condition in order to get the medical treatment by the related doctor. Before the doctor gives the medical treatment, the nurse needs to check up the vital signs of the patient which includes respiration, blood pressure, body weight and height, and body temperature. The nurse will note the whole process then input it to the system with the output of medical record. The form to enter the data of vital signs is shown on Figure 10while the form to input medical record is shown on Figure 11 along these lines.

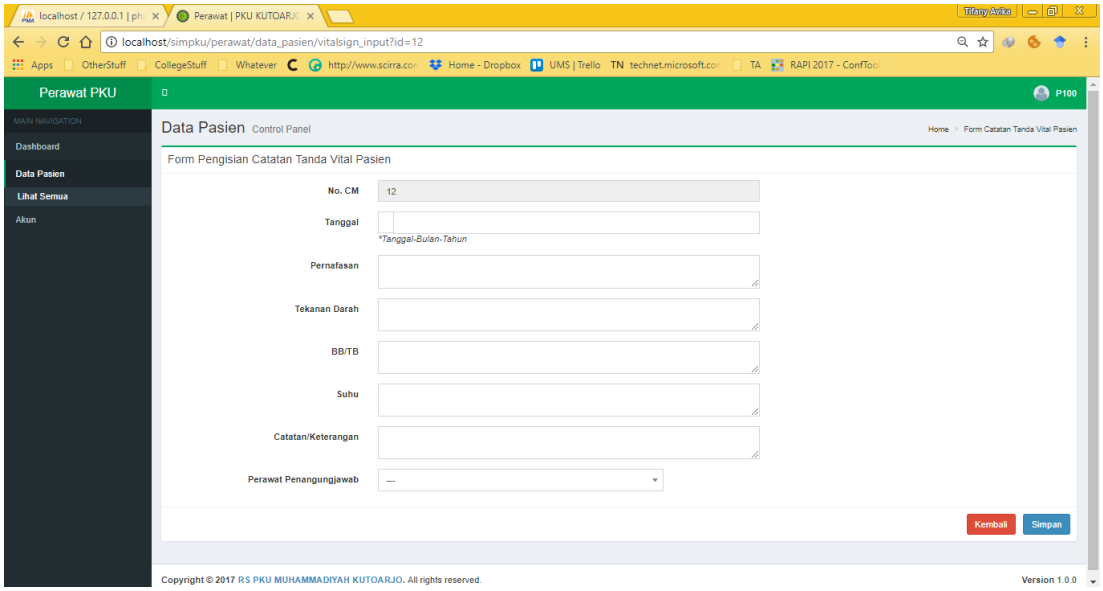

Figure 10. Vital Signs Input Form

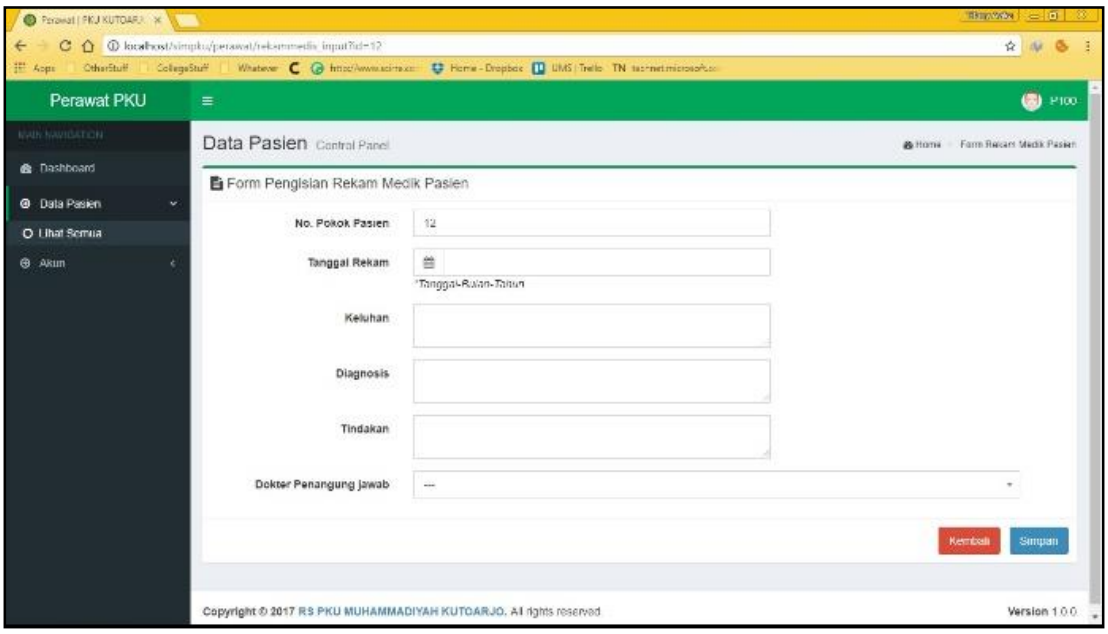

Figure 11. Medical Record Input Form

It can be noticed from the image above that the form consists of several columns too be filled, such as “No. PokokPasien” that is automatically filled by the system when the nurse or doctor wants to enter the medical data of the related patient, “TanggalRekam” to record the date of medical examinationperformed, “Keluhan” to enter the complaint of illness felt by the patient, “Diagnosis” to insert the disease diagnose of the patient after doing some examination, “Tindakan” to write the treatment by the doctor, and “DokterPenanggungjawab” that is filled by the doctor who treat the patient. After filling the form of medical record and submitting the data to database by clicking on “Simpan” button, the details can be viewed as shown at Figure 12 below.

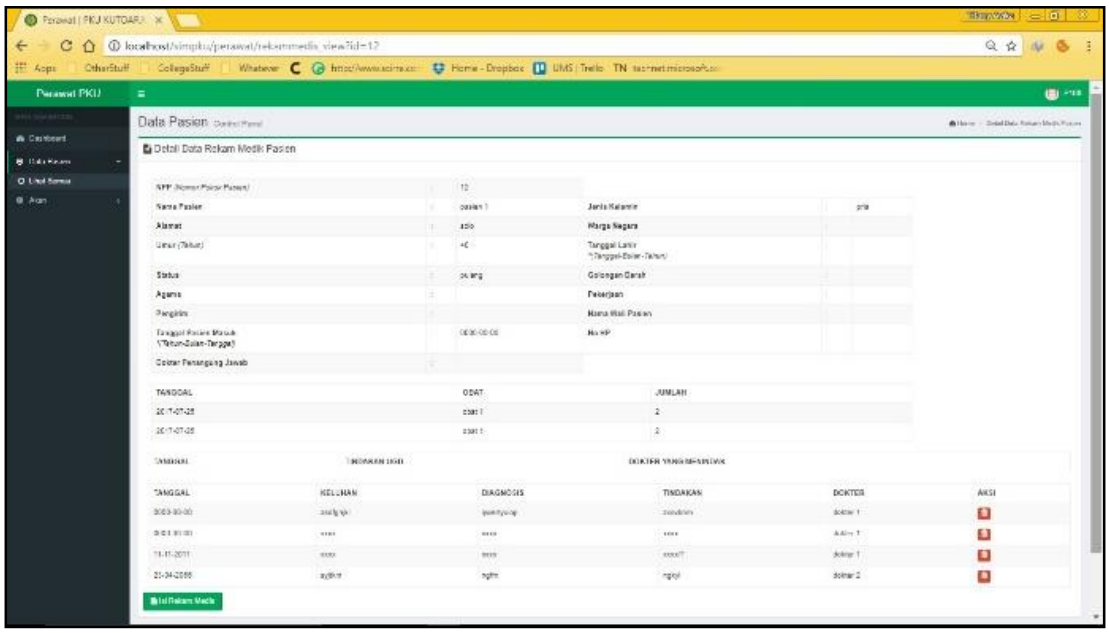

Figure 12. Medical Record View Layout

The medical record of the patient can be accessed by all doctors and nurses in the hospital although every patient has their own one responsible doctor. If there is a mistake in filling the record data, so the doctor or the nurse can delete it. The medical record view also consists of the medicine consumed by the patient.

3.2 Discussion

Generally, the whole information system of patient medical services at PKU MuhammadiyahKutoarjo has already been satisfying although there is still some part to be developed better forward. The information system helps to assist the process of patient data distribution from the receptionist to other sections in the hospital. The patients can get a quick medical service because their data already stored and can be seen by the related person concerned that the progress of condition and related treatment is already real-time. The doctor does not have to check the patient from the beginning again in case they come to the hospital another time. Beside of the better services for the patient, in the hospital archive room also will not have a lot of stacks of papers because the need of paper is reduced along with the computerized information system.

The result of the testing is as shown on Table 1 as follows.

Table 1. System Testing Result

No.	Scenario	Test Case	Expectation	Result
1.	Login to system	Login using username and password	If the username and password correct then the system will redirect to the user page based on username and password	Success

2.	Processing patients' data	Inputting the patients' personal data, updating, deleting and viewing.	The patients' data directly stored in the database and the database is always up to date. The patient registration data also can be generated into a patient card to be printed. If the patients have to stay, so the receptionist can book a room for them.	Success
3.	Processing medical services of the patients	Inputting the record of medical service courses for patients to the system, deleting the wrong data, and viewing the details.	Doctors and nurses can access the patients' medical record in the system. Then when grievance, diagnose, and treatment input is completed, they are stored directly to the related table. If the data already submitted is wrong, it can be deleted.	Success

4. CONCLUSION

From the development process of patient medical services information system, it can be concluded that the system runs well generally besides the deficiencies to be completed later. Compared to the previously installed information system at the hospital, this system has no many features as that system so that every feature can be used more effective. Actually, the previous system has already been very complete but it also has many features that are not used by the hospital party. The previously installed system was installed using localhost so that only several computers can access the system, but it is not secured at signing in to the system because all usernames and passwords are same.

The system, however, needs to be developed more because it still has deficiencies. For further development, it may be possible to make the database simpler since the recent database has too many tables and data that it can be overload.

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